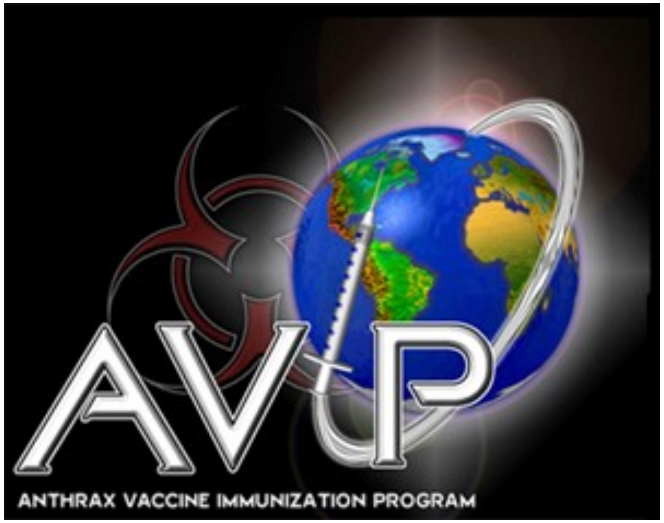


Anthrax Vaccine Immunization Program

DoD Health Care Provider's Briefing

Updated: 7 Dec 1999

Key Messages

- Anthrax used as a biological weapon represents a grave and urgent threat to U.S. Armed Forces

- Weaponized anthrax is as lethal as the Ebola virus
  - once symptoms develop, death is > 99 percent certain in unvaccinated, untreated individuals

- We have a safe and effective vaccine, licensed by the FDA, to protect against the deadly threat of anthrax weapons

Updated: 7 Dec 1999

Anthrax

- Anthrax is a known biological weapon.
- Inhalational anthrax is highly lethal.
- Vaccination against anthrax is critical for
  your protection.
- This is a mandatory vaccination program,
  except for legitimate medical exemptions.

Updated: 7 Dec 1999

Threat

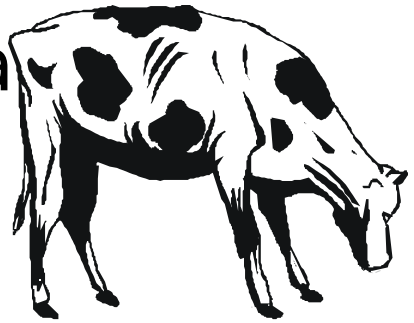
- Anthrax: the most likely Biological Warfare agent:
  - Easy and cheap to produce
  - Spores make an effective biological weapon
  - Can be stored for a long time
  - Can be dispersed in air by a variety of weapons
  - Inhalational anthrax is highly lethal
  - Odorless, colorless, tasteless, difficult to detect
- Anthrax will cause widespread illness and death among unprotected personnel.

Background on Anthrax

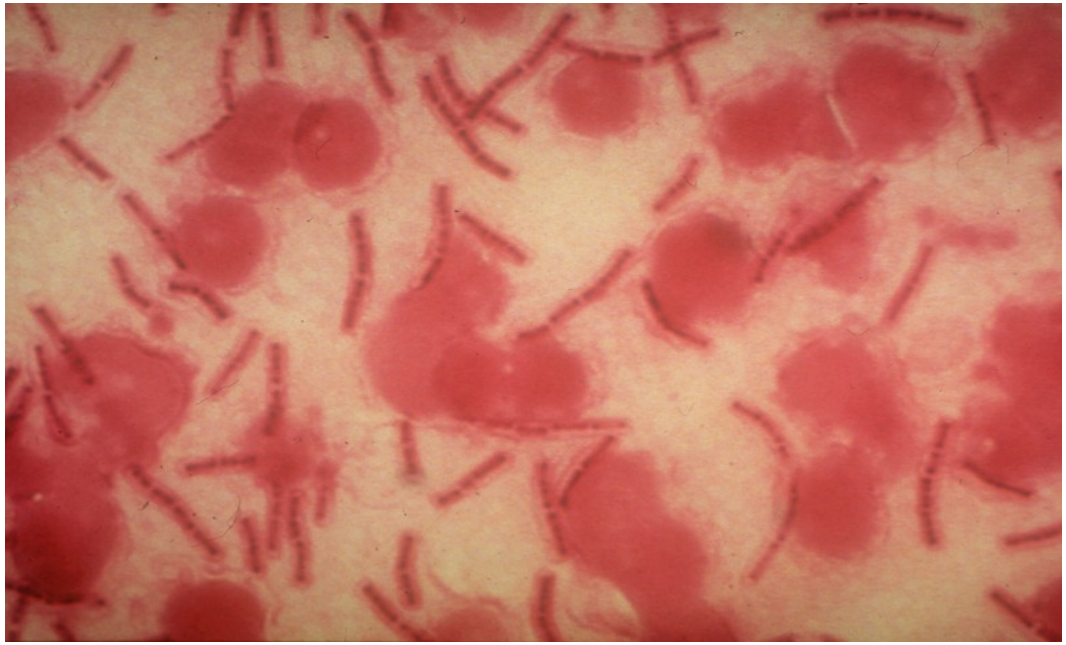
- Recognized as an illness for centuries
- Spores can survive in soil for decades
- Once common where livestock were raised
- Animal anthrax controlled with a vaccine for livestock
- Human infection usually results from direct contact with infected animals or animal products

Epidemiology of Anthrax

- Disease of herbivores
- Man infected via animal products
- Dramatic reduction in the U.S. since the early 1900s
- Still a problem in Asia and Africa



Microbiology of Anthrax



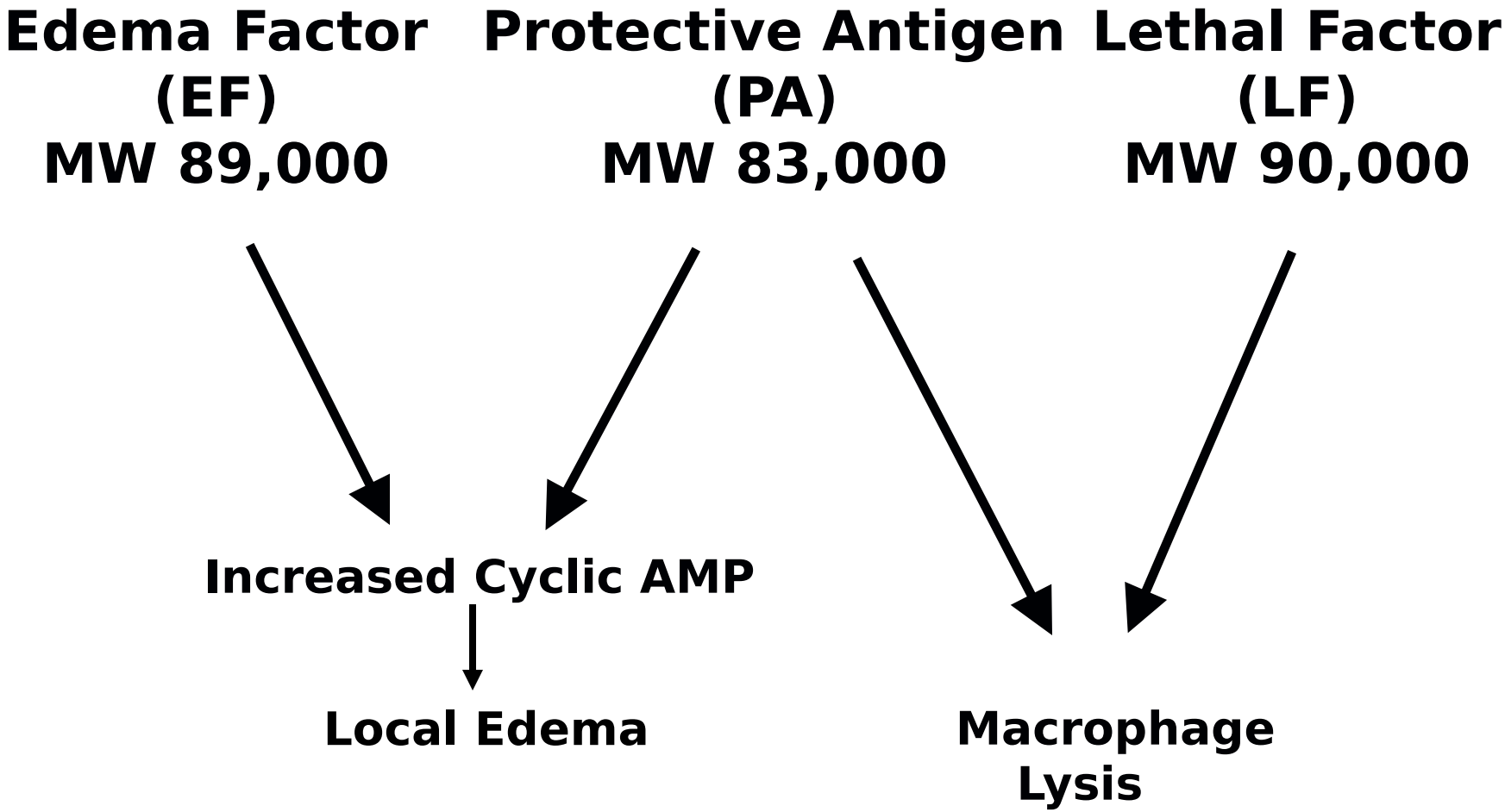
Gram positive spore-forming rod

Updated: 7 Dec 1999

Pathogenesis

- Spore enters skin, GI tract or lung
- Ingested by macrophages
- Transported to regional lymph nodes
- Germinate in regional nodes, mediastinum (inhalational)
- Local production of toxins
- Edema & necrosis
- Bacteremia & toxemia
- Seeding of other organ systems

Anthrax Toxin Effects

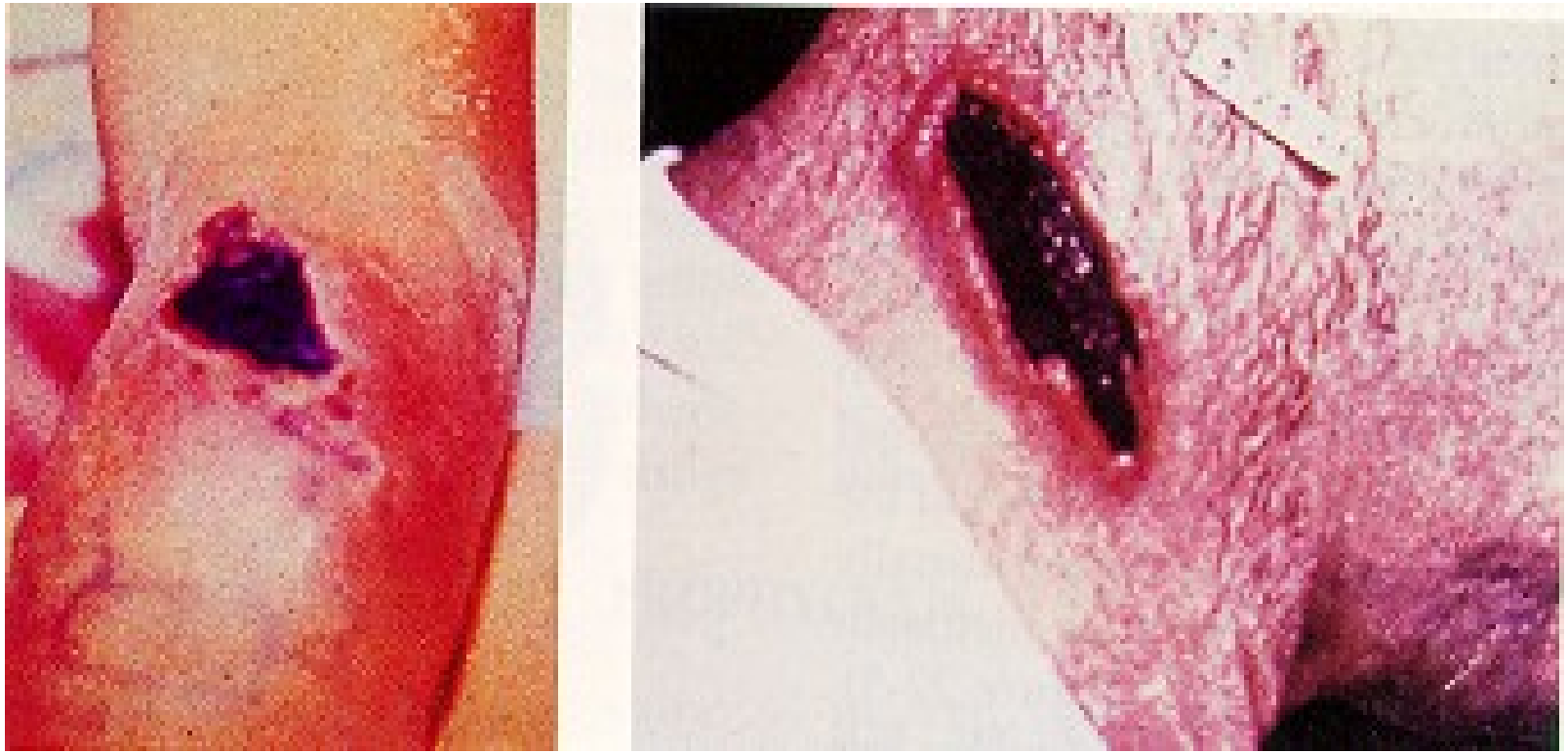


Cutaneous Anthrax

- Greater than 95% of naturally occurring cases
- Spores enter breaks in skin after contact with contaminated animal products
- Papule - Vesicle - Ulcer - Eschar
- Up to 20% case fatality rate if untreated
- Mortality with treatment < 1%

Updated: 7 Dec 1999

Cutaneous Anthrax:
Cutaneous Ulcer



Updated: 7 Dec 1999

Gastrointestinal Anthrax

- Ingestion of insufficiently cooked meat from infected animals
- Nausea, vomiting, fever, abdominal pain
- Mortality may exceed 50% despite treatment

Updated: 7 Dec 1999

Inhalational Anthrax

- Inhalational anthrax occurs when spores enter the body through the lungs
- Not transmitted person to person
- Spores migrate to lymph system where bacteria multiply and produce lethal toxins
- Toxins cause bleeding and destruction of the brain or vital organs in the chest, resulting in death

Diagnosis of Inhalational Anthrax

- Initial symptoms nonspecific
- Development of respiratory distress
  - CXR with widened mediastinum
  - Usually no infiltrates
- Sputum not helpful
- Swabs; nares
- Blood cultures - positive late in course of illness
- Hemorrhagic pleural effusion or meningitis

Chest X-Ray of Inhalational Anthrax

Updated: 7 Dec 1999

Inhalational Anthrax Treatment

- Early IV antibiotics and intensive care required
  - Mortality may still exceed 80%
  - Penicillin - historical treatment
- Current treatment of choice:
  - Ciprofloxacin 400 mg IV q 8-12 h
  - Doxycycline 200 mg IV x 1 then 100 mg IV q 12 h
- Disease is not spread by respiratory secretions
  - Use Standard Precautions

Post-Exposure Prophylaxis

- Starting antibiotics within 24 hours after aerosol exposure is expected to provide significant protection
  - Ciprofloxacin 500 mg po BID
  - Doxycyline 100 mg po BID
- Most effective when combined with vaccination
- Antibiotics are still indicated even when fully immunized

Updated: 7 Dec 1999

Anthrax Vaccine

- Licensed by the FDA since 1970
  - Safely administered in the U.S. to at-risk veterinarians, laboratory workers, and livestock handlers
- No whole or live anthrax bacteria
  - Contains protective antigen (PA)
  - Cannot cause anthrax disease
- Manufactured in U.S. by BioPort Corporation
  - Lansing, Michigan
- Dosing schedule: 0, 2, 4 weeks, 6, 12, 18 months, plus annual boosters

Updated: 7 Dec 1999

Human Efficacy

- Brachman, et al. *Am Journal of Public Health*, 1962; 52:432-45.
  - Efficacy: 92.5% (95% CI: 65-100%)
  - Inhalational disease:
    - 5 cases / 870 unvaccinated
    - 0 cases / 379 vaccinees
  - Manufacturing improvements, 1960s CDC study
    - Microaerophilic, more PA, less EF and LF
  - Safety and efficacy reaffirmed by FDA advisory panel, Federal Register 1985; 50:51002-117

Updated: 7 Dec 1999

Evidence Of Efficacy: Primate Challenge Trials

- 30 monkeys vaccinated twice
  - Challenged with aerosol at either 8, 16, 38, or 100 weeks later
  - 29 survived (1 died at 100 week challenge)
- 10 monkeys vaccinated once
  - Challenged with aerosol 6 weeks later
  - All survived
- In an unpublished study, 5 of 5 survived
- Overall 44 of 45 (98%) vaccine protective efficacy

Updated: 7 Dec 1999

Vaccine Protection Against Different Strains

- Vaccine efficacy demonstrated against numerous anthrax strains (types) in animal studies
- Protective antigen is the common disease-causing protein in all anthrax strains
- Therefore, anthrax vaccine protection is expected against all strains

Vaccine Efficacy - Inhalational Anthrax

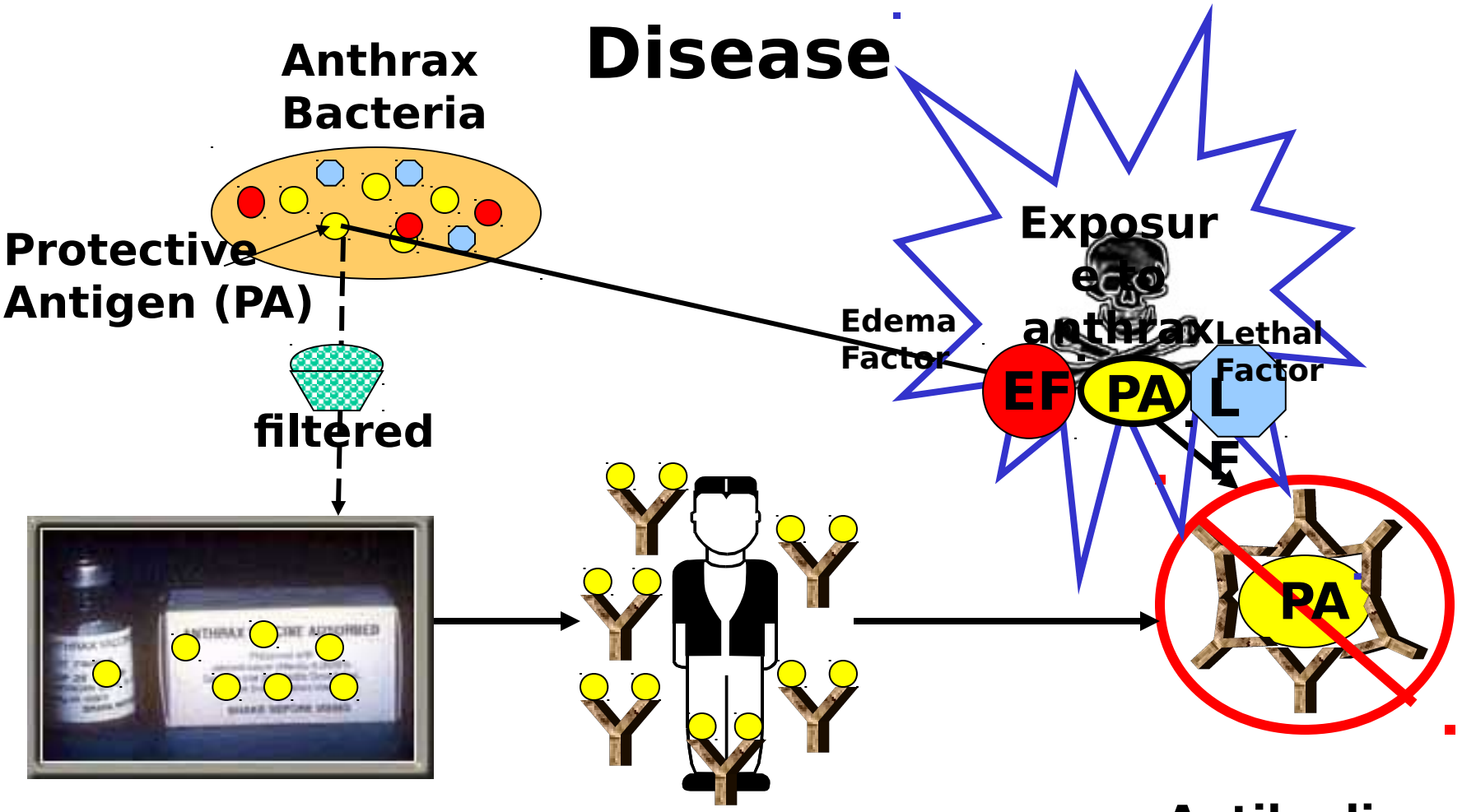
- Human antibody response
- Animal protection data
- Compelling evidence that the vaccine series will be effective at preventing disease after an aerosol exposure

Updated: 7 Dec 1999

Response to Vaccination

- Anthrax vaccine, like other vaccines, stimulates your body to produce protective antibodies
- The full series is needed to obtain maximum and on-going protection
- Even with a good antibody response, your defense system can be overwhelmed, given a massive number of spores. Use your mask too.

How Anthrax Vaccine Prevents Disease

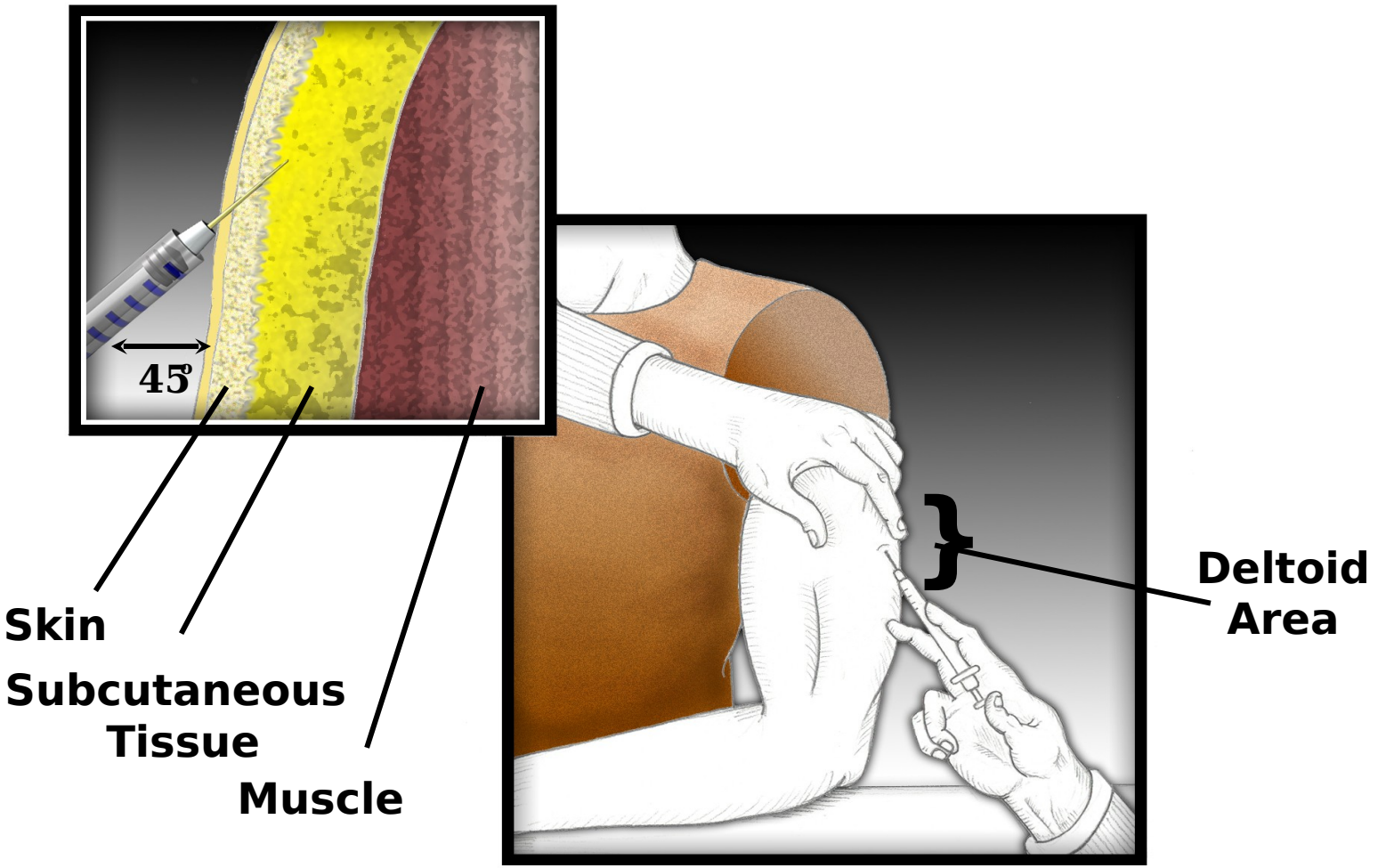


Vaccine contains PA, extracted from anthrax bacteria.

Immune system develops antibodies (Y) to PA, protection from disease.

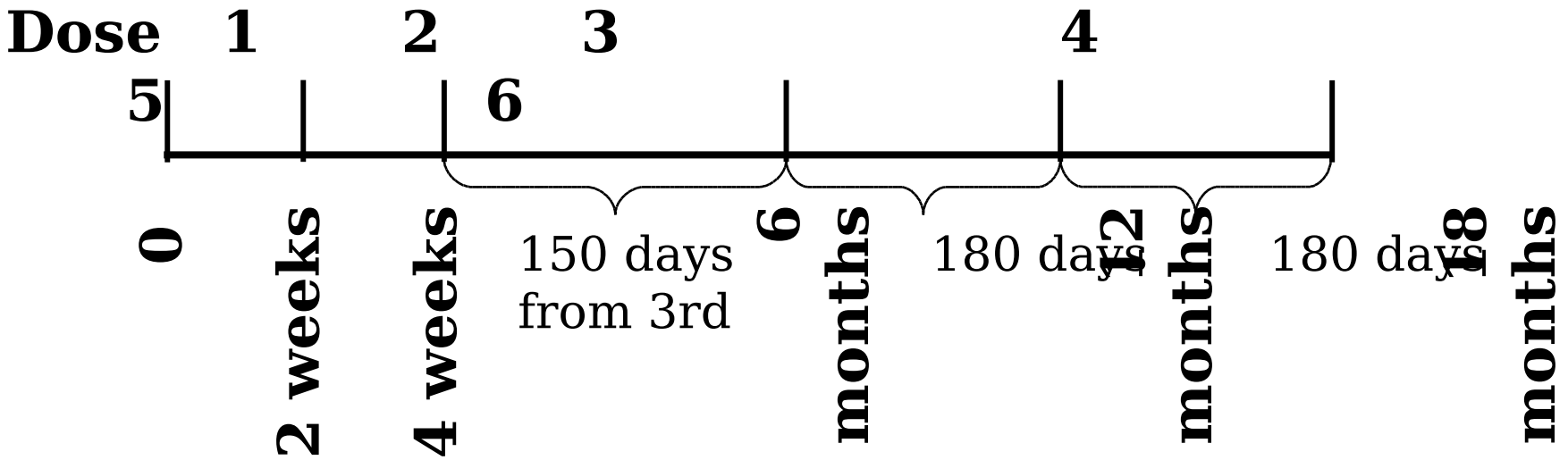
Antibodies "neutralize" PA, common part of anthrax toxins.

Vaccination



Updated: 7 Dec 1999

Vaccine Schedule



Six shots over 18 months, plus annual boosters

Updated: 7 Dec 1999

Standard Interval Between Doses

Between Interval		*Minimum*
• Doses 1 & 2	-	14 days
• Doses 2 & 3	-	14 days
• Doses 3 & 4	-	150 days
• Doses 4 & 5	-	180 days
• Doses 5 & 6	-	180 days
• Booster	-	Annually

Updated: 7 Dec 1999

Anthrax Vaccination Schedule

- The DoD policy is to adhere to the FDA approved vaccination schedule.
- If documented gap after dose #1 is greater than two years, restart the series. Once given dose #2 or beyond, do not restart the series.
- Late doses should be given ASAP - adjust timing of subsequent doses according to the standard interval schedule.

Updated: 7 Dec 1999

Access to DoD Medical Treatment Facility (MTF)

- Once designated, the following personnel may receive any dose at any MTF:
  - Active component
  - Reserve component (Must be in a duty status)
  - Emergency essential DoD civilian and contract personnel
  - U.S. Coast Guard as applicable
- Mass immunizations require prior coordination with MTF.

Updated: 7 Dec 1999

Record Keeping

- Automated immunization tracking
  - Service systems and DEERS central repository
- Written entries:
  - Health record
  - Adult Preventive and Chronic Care Flowsheet (DD form 2766 or DD form 2766C)
  - Yellow Shot Card (PHS-731)
- Required documentation:
  - Date immunized, name of vaccine, manufacturer, lot number, series number, dosage, provider name and MTF address

Vaccine Quality Control

- Each batch of any vaccine manufactured in the U.S. must meet FDA specifications and prescribed standards per 21 CFR 610
  - Potency, Sterility, Safety, Purity
- Testing done at manufacturer; results submitted to the FDA
- Prior to release, all stockpiled anthrax vaccine lots must pass supplemental testing

Updated: 7 Dec 1999

Handling Anthrax Vaccine

- Vaccine must be refrigerated
  - Store and maintain between 36 and 46 degrees Fahrenheit
- DO NOT FREEZE
- Once vial opened, use until expired
  - Discard if contaminated
- Go to USAMMA web site for guidance on vaccine temperature, storage and handling:
  - http://www.medicine.army.mil/usamma/anthrax/antxhome.htm

Updated: 7 Dec 1999

Pregnancy

- Vaccinations routinely deferred during pregnancy
- Before vaccination, ask each woman if pregnant, defer vaccination if pregnant
  - Continue when no longer pregnant
- No reason to delay pregnancy or conception efforts after vaccination
- Breast feeding not a contraindication to vaccination

Contraindications

- Hypersensitivity reaction to a previous dose of anthrax vaccine or vaccine component
- Younger than 18 or older than 65
- HIV positive
- Temporary deferral
  - Pregnancy
  - Active infection/illness with fever
  - Depressed immune response to include corticosteroid or other immunosuppressive treatment

Updated: 7 Dec 1999

Injection-Site Reactions

- From Hawaii, Korea, Ft. Bragg, Ft. Detrick, 1993-99: Redness, itching, swelling (lasting a few days)
  - Less than 1 inch: men up to 30%, women up to 60%
  - 1 to 5 inches: 1% to 5%
  - Greater than 5 inches: up to 1%
  - Swelling may extend below elbow
- Soreness or local pain in 8% to 19%
- Lump: 30% to 90% (may persist a few weeks)
- Women report reactions more often than men

Systemic Events

(Events Away from the Injection Site)

- From 5% to 35% will notice:
  - – Muscle aches, joint aches, chills, low-grade fever,

    no appetite, headaches, nausea, malaise, related

    symptoms
  - – Women report these symptoms more often than men
  - – These symptoms usually go away in a few days, less

    than a week

Injection-Site Reactions and Systemic Events

- Ask your health care provider whether ibuprofen, acetaminophen, antihistamines, or other medications may help reduce bothersome symptoms.
- Report adverse events after vaccination to health care provider promptly, before additional vaccinations.

Adverse Event Reporting

- Vaccine Adverse Event Reporting System (VAERS)
  - FDA reviews 100% of adverse-event reports submitted to either FDA or DoD
  - Anyone can submit a Form VAERS-1
- DoD requires a Form VAERS-1 submission for:
  - Loss of duty greater than 24 hours
  - Hospitalization
  - Suspected vaccine vial contamination
- Other submissions permitted
- Form VAERS-1 may be obtained from:
  - 1-800-822-7967/ www.anthrax.osd.mil/vaers/vaers.htm

Updated: 7 Dec 1999

Reserve Component Adverse-Event Guidance

- An individual experiencing a vaccine-associated adverse event in a non-duty status:
  - Seek medical evaluation at a DoD, USCG, or civilian medical treatment facility, if necessary
  - Must report the event to your unit commander or designated representative as soon as possible
  - See local medical department or squadron for guidance
- Commander will determine Line of Duty and/or Notice of Eligibility status, if required

Updated: 7 Dec 1999

Conclusions

- Anthrax is a significant threat to our forces
- Anthrax vaccine is safe and effective
- Personal protective measures are still important
- Life saving benefit of anthrax vaccine make this a mandatory immunization program
- Vaccination is a crucial part of force health protection and readiness

Updated: 7 Dec 1999

Information Sources

- Chain of command
- Http://www.anthrax.osd.mil
- Http://www.defenselink.mil
- Http://www.cdc.gov
- Http://www.aviationmedicine.com
- Call Toll Free 1-877-GET-VACC
  (1-877-438-8222)

Updated: 7 Dec 1999